

# APPENDIX A

FOUO 42908260

## Phonics Blocks, Phonetic Generalizations Outlined

Pass 1: *The first pass for each letter assigns the normal sound for that letter*

Pass 2:

When two of the same consonants appear side by side, only one is heard.

Example: "berry"

Pass 3:

'ch' = /ch/, phoneme #19

Example: cherry

Pass 4:

When the letters 'ght' are together, 'g' and 'h' are silent.

Example: 'night'

Pass 5:

The letter 'g' makes a soft sound before the letters 'e' and 'i'.

Example: "gem"

Pass 6:

The letter 'c' makes a soft sound before the letters 'e' and 'i'.

Example: "cent"

Pass 7:

When a word ends in 'ck', it has the /k/ sound.

Example: "sick"

Pass 8:

When a word begins with 'kn', the letter 'k' is silent.

Example: "know"

Pass 9:

When a word begins with 'wr', the letter 'w' is silent.

Example: "write"

Pass 10:

Words having a double 'e', usually have the long 'e' sound.

Example: "feet"

Passes 11 & 12:

The letter 'r' changes the quality of the preceding vowel.

Example: "burn"

Pass 13:

When the letter 'y' is the final vowel in a word, it usually has a vowel sound.

Example: "why"

Pass 14:

In 'ay', the 'y' is silent and gives 'a' its long sound.

Example: "play"

Pass 15:

If the only vowel is the final letter, it usually represents its long vowel sound.

Example: 'me'

Pass 16:

When the letter 'i' is followed by the letters 'gh', the 'i' is long and the 'g' and 'h' are silent.

Example: 'sigh'

Pass 17:

When two 'o's are next to each other, they represent the phoneme #43.

Example: 'moon'

Pass 18:

When the letters 'e' and 'w' are next to each other, they represent the phoneme #43.

Example: 'dew'

Pass 19:

When there is a 'u' followed by a consonant and an 'e', the 'u' represents the phoneme #43.

Example: 'dude'

Pass 20:

When the letters 'o' and 'u' are next to each other (in the form 'ou'), they represent the phoneme #42.

Example: 'proud'

Pass 21:

When the letter 'n' is directly preceded by 'g', the 'g' is silent.

Example: 'gnu'

Pass 22:

When the letter 'y' is directly preceded by 'o', they represent the phoneme #41.

Example: 'boy'

Pass 23:

When the letter 'h' is directly preceded by the letter 'w', they represent the phoneme #24.

Example: 'who'

Pass 24:

Silent 'e' - makes the preceding vowel long (when there is a consonant between the two).

Example: "name"

Pass 25:

When a word ends in 'ed', the preceding vowel represents its long vowel sound.

Example:

Pass 26:

When a word ends in 'es', the preceding vowel represents its long vowel sound.

Example:

Pass 27:

When a word ends in 'er', the preceding vowel represents its long vowel sound.

Example:

Pass 28:

When the letter 'u' is directly preceded by 'q', the 'q' represents phoneme #7 (/k/) and the 'u' represents the phoneme #16 (/w/).

Example: 'quilt'

Pass 29:

When the letter 'p' is directly followed by the letter 'h', they represent phoneme #3 (/f/).

Example: 'phonics'

Pass 30:

When the letter 'n' is directly followed by the letter 'g', the 'n' represents phoneme #25 and the 'g' is silent. \*Note, this needs to be changed in the code.

Example: 'phonics'

Pass 31:

When the letter 's' is directly followed by the letter 'h', they represent the phoneme #20.

Example: 'shut'

Pass 32:

When the letter 't' is directly followed by the letter 'h', they represent the phoneme #22.

Example: 'the'

Pass 33:

When the letter 'a' is directly followed by the letter 'w', they represent the phoneme #40.

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Example: 'draw'

Pass 34:

When the letter 'a' is directly followed by the letter 'i', they represent the phoneme #26.

Example: 'paid'

Pass 35:

When the letter 'o' is directly followed by the letter 'a', they represent the phoneme #29.

Example: 'boat'

Pass 36:

When the letter 'e' is directly followed by the letter 'a', they represent the phoneme #27.

Example: 'pea'

Pass 37:

When the letters 'ould' appear in this order, they represent the phoneme sequence 44, 44, 0, 2

Example: 'could'

Pass 38:

When the letters 'tion' appear in this order, they represent the phoneme sequence 20, 20, 36, 10

Example: 'nation'

Pass 39:

When the letters 'sion' appear in this order, they represent the phoneme sequence 20, 20, 36, 10

Example: 'tension'

Pass 40:

When there are two 'c's followed by 'e' or 'i', the first 'c' represents a hard sound (/k/), and the second 'c' represents a soft sound (/s/).

Example: 'success'

Pass 41:

When the letter 'o' is directly followed by the letter 'i', they represent the phoneme #41.

Example: 'foil'

Pass 42:

When 's' is the last letter in a word, it represents the sound /z/.

Example: 'faces'

Pass 43:

When the letters 'tch' appear in this order, the 't' is silent.

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Example: 'itch'

Pass 44:

When the letters 'r' or 'k' are directly followed by 'h', the 'h' is silent.

Example: 'rhino'

Pass 45:

When the letter 'm' is directly followed by the letter 'b', the 'b' is silent.

Example: 'lamb'

Pass 46:

When the letters 'k' or 'm' are directly preceded by the letter 'l', the 'l' is silent.

Example: 'talk', 'calm'

Pass 47:

When the letter 'b' is directly followed by the letter 't' at the end of a word, the 'b' is silent.

Example: 'debt'

Pass 48:

When the letter 'm' is directly followed by the letter 'n', the 'n' is silent.

Example: 'hymn'

Pass 49:

When an 'h' is the last letter of a word and is directly preceded by a vowel, the 'h' is silent.

Example: '

Pass 50:

When the string of letters 'who' are at the beginning of a word, the 'w' is silent.

Example: 'who'

Pass 100:

When the letter 'd' is directly followed by the letter 'g' or the letter 'j', the 'd' is silent.

Example: 'judge', 'adjust'

Pass 101:

When the letter 's' is directly followed by the letter 'm' at the end of a word, the 's' has a /z/ sound.

Example: 'chasm'

## APPENDIX B

FOUO 4/29/82

```

/vpass1 {
    0 1    wlen {
        /x exch def
        workingvword 1 get
        x
        Alphabet word x get get
        /snorm get
        put
        workingvword 2 get
        x 1 x bitshift put
    } for
} def

// double consonants
/vpass2 {
    /prev '.' def
    0 1    wlen {
        /x exch def
        word x get prev eq {
            x x 1 sub light2gether
        } if
        /prev word x get def
    } for
} def

// ch
/vpass3 {
    /prev '.' def
    0 1    wlen {
        /x exch def
        word x get 'h' eq prev 'c' eq and {
            x x 1 sub light2gether
            "19" x soundlikethis
            "19" x 1 sub soundlikethis
        } if
        /prev word x get def
    } for
} def

// ght
/vpass4 {
    2 1    wlen {
        /x exch def
        word x get 't' eq {
            word x 1 sub get 'h' eq
            word x 2 sub get 'g' eq

```

// array

// array int

// array int dict

// array int string

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```

        and {
            x x 1 sub x 2 sub light3gether
            "0" x 1 sub soundlikethis
            "0" x 2 sub soundlikethis
        } if
    } if
} for
} def

```

```

    // soft 'g'
/vpass5 {
    0 1    wlen 1 sub {
        /x exch def
        word x get 'g' eq {
            word x 1 add get 'i' eq
            word x 1 add get 'e' eq
            or {
                x x 1 add lightthistoo
                "6" x soundlikethis
            } if
        } if
    } if
} for
} def

```

```

    // soft 'c'
/vpass6 {
    0 1    wlen 1 sub {
        /x exch def
        word x get 'c' eq {
            word x 1 add get 'i' eq
            word x 1 add get 'e' eq
            or {
                x x 1 add lightthistoo
                "13" x soundlikethis
            } if
        } if
    } if
} for
} def

```

```

    // 'ck' at the end
/vpass7 {
    word wlen 2 sub get 'c' eq {
        word wlen 1 sub get 'k' eq {
            wlen 2 sub wlen 1 sub light2gether
            "7" wlen 2 sub soundlikethis
        }
    }
}

```

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```

                                "7" wlen 1 sub soundlikethis
                                } if
                                } if
} def

// 'kn' at the beginning
/vpass8 {
    word 0 get 'k' eq {
        word 1 get 'n' eq {
            0 1 lightthistoo
            "0" 0 soundlikethis
        } if
    } if
} def

// 'wr' at the beginning
/vpass9 {
    word 0 get 'w' eq {
        word 1 get 'r' eq {
            0 1 lightthistoo
            "0" 0 soundlikethis
        } if
    } if
} def

// double e
/vpass10 {
    /prev '.' def
    0 1 wlen {
        /x exch def
        word x get 'e' eq prev 'e' eq and {
            x x 1 sub light2gether
            "27" x soundlikethis
            "27" x 1 sub soundlikethis
        } if
        /prev word x get def
    } for
} def

// vowel preceeds 'r'
/vpass11 {
    1 1 wlen {
        /x exch def
        word x get 'r' eq {

```

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```

word x 1 sub get 'i' eq {
    "38" x soundlikethis
    "38" x 1 sub soundlikethis
    x 1 sub x lightthistoo
} if
word x 1 sub get 'u' eq {
    "38" x soundlikethis
    "38" x 1 sub soundlikethis
    x 1 sub x lightthistoo
} if
word x 1 sub get 'e' eq {
    "38" x soundlikethis
    "38" x 1 sub soundlikethis
    x 1 sub x lightthistoo
} if
word x 1 sub get 'a' eq {
    "39" x soundlikethis
    "39" x 1 sub soundlikethis
    x 1 sub x lightthistoo
} if
word x 1 sub get 'o' eq {
    "48" x soundlikethis
    "48" x 1 sub soundlikethis
    x 1 sub x lightthistoo
} if
} if
/prev word x get def
} for
} def
/vpass12 {
    1 1 wlen 1 sub {
        /x exch def
        word x get 'r' eq word x 1 add get 'e' eq and {
            word x 1 sub get 'a' eq {
                // the 'a'
                "37" x 1 sub soundlikethis
                x 1 sub x lightthistoo
                x 1 sub x 1 add lightthistoo
                // the 'e'
                "0" x 1 add soundlikethis
                x 1 add x 1 sub lightthistoo
            } if
            word x 1 sub get 'o' eq {
                "48" x 1 sub soundlikethis

```

```

        x 1 sub x lightthistoo
        x 1 sub x 1 add lightthistoo
        // the 'e'
        "0" x 1 add soundlikethis
        x 1 add x 1 sub lightthistoo
    } if
} if
/prev word x get def
} for
} def

/vpass13 {
    word wlen 1 sub get 'y' eq {
        countvowels 0 eq {
            "28" wlen 1 sub soundlikethis
        }{
            "27" wlen 1 sub soundlikethis
        } ifelse
    } if
} def

/vpass14 {
    1 1 wlen {
        /x exch def
        word x get 'y' eq {
            word x 1 sub get 'a' eq {
                "26" x 1 sub soundlikethis
                "0" x soundlikethis
                x x 1 sub light2gether
            } if
        } if
    } for
} def

/vpass15 {
    countvowels 1 eq {
        /pos wlen 1 sub def
        /letter word wlen 1 sub get def
        letter 'e' eq {
            "27" pos soundlikethis
        } if
        letter 'i' eq {
            "28" pos soundlikethis

```

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```

    } if
    letter 'o' eq {
        "29" pos soundlikethis
    } if
} if
} def

```

```

/vpass16 {
    2 1    wlen {
        /x exch def
        word x get 'h' eq word x 1 sub get 'g' eq and {
            word x 2 sub get 'i' eq {
                "0" x soundlikethis
                "0" x 1 sub soundlikethis
                "28" x 2 sub soundlikethis
                x x 1 sub x 2 sub light3gether
            } if
        } if
    } for
} def

```

```

// double o
/vpass17 {
    /prev '.' def
    0 1    wlen {
        /x exch def
        word x get 'o' eq prev 'o' eq and {
            x x 1 sub light2gether
            "43" x soundlikethis
            "43" x 1 sub soundlikethis
        } if
        /prev word x get def
    } for
} def

```

```

// ew
/vpass18 {
    1 1    wlen {
        /x exch def
        word x get 'w' eq word x 1 sub get 'e' eq and {
            x x 1 sub light2gether
            "43" x soundlikethis
            "43" x 1 sub soundlikethis
        } if
    } for
} def

```

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```

    } if
  } for
} def

// u consonant e
/vpass19 {
  2 1    wlen {
    /x exch def
    word x get 'e' eq word x 2 sub get 'u' eq and {
      word x 1 sub get isconsonant {
        x x 2 sub light2gether
        "0" x soundlikethis
        "43" x 2 sub soundlikethis
      } if
    } if
  } for
} def

```

```

// 'ou'
/vpass20 {
  1 1    wlen {
    /x exch def
    word x get 'u' eq word x 1 sub get 'o' eq and {
      x x 1 sub light2gether
      "42" x soundlikethis
      "42" x 1 sub soundlikethis
    } if
  } for
} def

```

```

// 'gn'
/vpass21 {
  1 1    wlen {
    /x exch def
    word x get 'n' eq word x 1 sub get 'g' eq and {
      x 1 sub x lighththistoo
      "0" x 1 sub soundlikethis
    } if
  } for
} def

```

```

// oy
/vpass22 {
  0 1    wlen 1 sub {
    /x exch def

```

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```

word x get 'o' eq
word x 1 add get 'y' eq and {
    "41" x soundlikethis
    "41" x 1 add soundlikethis
    x x 1 add light2gether
} if
} for
} def

```

```

// 'wh'
/vpass23 {
    /prev '.' def
    0 1 wlen {
        /x exch def
        word x get 'h' eq prev 'w' eq and {
            x x 1 sub light2gether
            "24" x soundlikethis
            "24" x 1 sub soundlikethis
        } if
        /prev word x get def
    } for
} def

```

```

// silent 'e' at end
/vpass24 {
    word wlen 1 sub get 'e' eq {
        countvowels 2 eq {
            word wlen 2 sub get isconsonant {
                "0" wlen 1 sub soundlikethis
                0 1 wlen 2 sub {
                    /x exch def
                    /letter word x get def
                    letter 'a' eq {
                        "26" x soundlikethis
                        wlen 1 sub x light2gether
                    } if
                    letter 'e' eq {
                        "27" x soundlikethis
                        wlen 1 sub x light2gether
                    } if
                    letter 'i' eq {
                        "28" x soundlikethis
                        wlen 1 sub x light2gether
                    } if
                }
            }
        }
    }
}

```

FOOOO "41" 2626



```
letter 'o' eq {
    "29" x soundlikethis
    wlen 1 sub x light2gether
} if
letter 'u' eq {
    "43" x soundlikethis
    wlen 1 sub x light2gether
} if
} for
} if
} if
} def

// ed
/vpass25 {
    word wlen 1 sub get 'd' eq word wlen 2 sub get 'e' eq and {
        countvowels 2 eq {
            word wlen 3 sub get isconsonant {
                "0" wlen 2 sub soundlikethis // e silent
                0 1 wlen 3 sub {
                    /x exch def
                    /letter word x get def
                    letter 'a' eq {
                        "26" x soundlikethis
                        wlen 2 sub x light2gether
                    } if
                    letter 'e' eq {
                        "27" x soundlikethis
                        wlen 2 sub x light2gether
                    } if
                    letter 'i' eq {
                        "28" x soundlikethis
                        wlen 2 sub x light2gether
                    } if
                    letter 'o' eq {
                        "29" x soundlikethis
                        wlen 2 sub x light2gether
                    } if
                    letter 'u' eq {
                        "43" x soundlikethis
                        wlen 2 sub x light2gether
                    } if
                } for
            } if
        }
    }
}
```

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```

    } if
  } def

    // es
  /vpass26 {
    word wlen 1 sub get 's' eq word wlen 2 sub get 'e' eq and {
      countvowels 2 eq {
        word wlen 3 sub get isconsonant {
          "0" wlen 2 sub soundlikethis // e silent
          0 1 wlen 3 sub {
            /x exch def
            /letter word x get def
            letter 'a' eq {
              "26" x soundlikethis
              wlen 2 sub x light2gether
            } if
            letter 'e' eq {
              "27" x soundlikethis
              wlen 2 sub x light2gether
            } if
            letter 'i' eq {
              "28" x soundlikethis
              wlen 2 sub x light2gether
            } if
            letter 'o' eq {
              "29" x soundlikethis
              wlen 2 sub x light2gether
            } if
            letter 'u' eq {
              "43" x soundlikethis
              wlen 2 sub x light2gether
            } if
          } for
        } if
      } if
    } def
  }

```

```

    // er
  /vpass27 {
    word wlen 1 sub get 'r' eq word wlen 2 sub get 'e' eq and {
      countvowels 2 eq {
        word wlen 3 sub get isconsonant {
          "38" wlen 1 sub soundlikethis //
        }
      }
    }
  }

```

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"38" wlen 2 sub soundlikethis //  
wlen 1 sub wlen 2 sub light2gether

0 1 wlen 3 sub {  
    /x exch def  
    /letter word x get def  
    letter 'a' eq {  
        "26" x soundlikethis  
        x wlen 2 sub lighthistoo  
    } if  
    letter 'e' eq {  
        "27" x soundlikethis  
        x wlen 2 sub lighthistoo  
    } if  
    letter 'i' eq {  
        "28" x soundlikethis  
        x wlen 2 sub lighthistoo  
    } if  
    letter 'o' eq {  
        "29" x soundlikethis  
        x wlen 2 sub lighthistoo  
    } if  
    letter 'u' eq {  
        "30" x soundlikethis  
        x wlen 2 sub lighthistoo  
    } if  
} for

    } if  
} def

    // qu  
/vpass28 {  
    0 1 wlen 1 sub {  
        /x exch def  
        word x get 'q' eq word x 1 add get 'u' eq and {  
            "46" x soundlikethis  
            "46" x 1 add soundlikethis  
            x x 1 add light2gether  
        } if  
    } for  
} def  
  
// ph

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```

/vpass29 {
  0 1   wlen 1 sub {
        /x exch def
        word x get 'p' eq word x 1 add get 'h' eq and {
          x x 1 add light2gether
          "3" x soundlikethis
          "3" x 1 add soundlikethis
        } if
      } for
} def

```

```

// ng
/vpass30 {
  0 1   wlen 1 sub {
        /x exch def
        word x get 'n' eq word x 1 add get 'g' eq and {
          x x 1 add light2gether
          "25" x soundlikethis
          "25" x 1 add soundlikethis
        } if
      } for
} def

```

```

// sh
/vpass31 {
  0 1   wlen 1 sub {
        /x exch def
        word x get 's' eq word x 1 add get 'h' eq and {
          x x 1 add light2gether
          "20" x soundlikethis
          "20" x 1 add soundlikethis
        } if
      } for
} def

```

```

// th
/vpass32 {
  0 1   wlen 1 sub {
        /x exch def
        word x get 't' eq word x 1 add get 'h' eq and {
          x x 1 add light2gether
          "22" x soundlikethis
          "22" x 1 add soundlikethis
        } if
      } for
} def

```

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} def

// aw

/vpass33 {

word wlen 2 sub get 'a' eq

word wlen 1 sub get 'w' eq and {

wlen 2 sub wlen 1 sub light2gether

"40" wlen 2 sub soundlikethis

"40" wlen 1 sub soundlikethis

} if

} def

// ai

/vpass34 {

0 1 wlen 1 sub {

/x exch def

word x get 'a' eq word x 1 add get 'i' eq and {

x x 1 add light2gether

"26" x soundlikethis

"26" x 1 add soundlikethis

} if

} for

} def

// oa

/vpass35 {

0 1 wlen 1 sub {

/x exch def

word x get 'o' eq word x 1 add get 'a' eq and {

x x 1 add light2gether

"29" x soundlikethis

"29" x 1 add soundlikethis

} if

} for

} def

// ea

/vpass36 {

0 1 wlen 1 sub {

/x exch def

word x get 'e' eq word x 1 add get 'a' eq and {

x x 1 add light2gether

"27" x soundlikethis

"27" x 1 add soundlikethis

} if

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```

    } for
} def

```

```

    // ould
/vpass37 {

```

```

    0 1    wlen 3 sub {
           /x exch def
           word x get 'o' eq word x 1 add get 'u' eq and {
               word x 2 add get 'l' eq word x 3 add get 'd' eq and {
                   x x 1 add light2gether
                   "44" x soundlikethis
                   "44" x 1 add soundlikethis
                   "0" x 2 add soundlikethis
                   x 2 add x lightthistoo
                   x 2 add x 1 add lightthistoo
                   x 2 add x 3 add lightthistoo
               } if
           } if

```

```

    } for
} def

```

```

    // tion
/vpass38 {

```

```

    0 1    wlen 3 sub {
           /x exch def
           word x get 't' eq word x 1 add get 'i' eq and {
               word x 2 add get 'o' eq word x 3 add get 'n' eq and {
                   "20" x soundlikethis
                   "20" x 1 add soundlikethis
                   "36" x 2 add soundlikethis
                   x x 1 add x 2 add light3gether
                   x x 3 add lightthistoo
                   x 1 add x 3 add lightthistoo
                   x 3 add x 3 add lightthistoo
               } if
           } if

```

```

    } for
} def

```

```

    // sion
/vpass39 {

```

```

    0 1    wlen 3 sub {
           /x exch def
           word x get 's' eq word x 1 add get 'i' eq and {
               word x 2 add get 'o' eq word x 3 add get 'n' eq and {

```

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```

"20" x soundlikethis
"20" x 1 add soundlikethis
"36" x 2 add soundlikethis
x x 1 add x 2 add light3gether
x x 3 add lightthistoo
x 1 add x 3 add lightthistoo
x 3 add x 3 add lightthistoo
    } if
  } if
} for
} def

// cc[ei]
/vpass40 {
  0 1    wlen 2 sub {
    /x exch def
    word x get 'c' eq word x 1 add get 'c' eq and {
      word x 2 add get 'e' eq
      word x 2 add get 'i' eq and {
        "7" x soundlikethis
        "13" x 1 add soundlikethis
        x x 1 add light2gether
        x x 2 add lightthistoo
        x 1 add x 2 add lightthistoo
      } if
    } if
  } for
} def

// oi
/vpass41 {
  0 1    wlen 1 sub {
    /x exch def
    word x get 'o' eq
    word x 1 add get 'i' eq and {
      x wlen 3 sub ge { // if there can't be an 'ng'
        "41" x soundlikethis
        "41" x 1 add soundlikethis
        x x 1 add light2gether
      }{
        // not n == false, not g == false
        word x 2 add get 'n' ne
        word x 3 add get 'g' ne or {
          "41" x soundlikethis
          "41" x 1 add soundlikethis
        }
      }
    }
  }
}

```

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```

x x 1 add light2gether
    } if
  } ifelse
} if
} for
} def

// s at end
/vpass42 {
  word wlen 1 sub get 's' eq
  wlen 2 ge and {
    wlen 2 sub getthissound isvoiced {
      "18" wlen 1 sub soundlikethis
    } {
      wlen 3 ge {
        wlen 2 sub getthissound issilent {
          wlen 3 sub getthissound isvoiced {
            "18" wlen 1 sub soundlikethis
          } if
        } if
      } if
    } ifelse
  } if
} def

// tch
/vpass43 {
  2 1 wlen {
    /x exch def
    word x get 'h' eq {
      word x 1 sub get 'c' eq
      word x 2 sub get 't' eq
      and {
        "0" x 2 sub soundlikethis
        x 2 sub x 1 sub lighththistoo
        x 2 sub x lighththistoo
      } if
    } if
  } for
} def

// rh - kh
/vpass44 {

```

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```

1 1    wlen {
        /x exch def
        word x get 'h' eq {
            word x 1 sub get 'r' eq
            word x 1 sub get 'k' eq or {
                "0" x soundlikethis
                x x 1 sub lightthistoo
            } if
        } if
    } for
} def

```

```

// mb
/vpass45 {
1 1    wlen {
        /x exch def
        word x get 'b' eq {
            word x 1 sub get 'm' eq {
                "0" x soundlikethis
                x x 1 sub lightthistoo
            } if
        } if
    } for
} def

```

```

// lk - lm
/vpass46 {
0 1    wlen 1 sub {
        /x exch def
        word x get 'l' eq {
            word x 1 add get 'm' eq
            word x 1 add get 'k' eq or {
                "0" x soundlikethis
                x x 1 add lightthistoo
            } if
        } if
    } for
} def

```

```

// bt at the end
/vpass47 {
    word wlen 1 sub get 't' eq
    word wlen 2 sub get 'b' eq and {

```

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```

    "0" wlen 2 sub soundlikethis
    wlen 2 sub wlen 1 sub lightthistoo
  } if
} def

```

```

    // mn
/vpass48 {
  0 1 wlen 1 sub {
    /x exch def
    word x get 'm' eq {
      word x 1 add get 'n' eq {
        "0" x 1 add soundlikethis
        x 1 add x lightthistoo
      } if
    } if
  } for
} def

```

```

    // vowel h at end
/vpass49 {
  word wlen 1 sub get 'h' eq {
    word wlen 2 sub get isvowel {
      "0" wlen 1 sub soundlikethis
      wlen 1 sub wlen 2 sub lightthistoo
    } if
  } if
} def

```

```

    // 'who' at beginning of word (must fix up wh rule)
/vpass50 {
  wlen 3 ge {
    word 0 get 'w' eq {
      word 1 get 'h' eq
      word 2 get 'o' eq and {
        "0" 0 soundlikethis
        "5" 1 soundlikethis // h back to before wh rule
        0 1 lightthistoo
        0 2 lightthistoo
      } if
    } if
  } if
} def

```

```

    // d - j sound
/vpass100 {

```

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106020-1290260

```

0 1    wlen 1 sub {
        /x exch def
        word x get 'd' eq {
            x 1 add getthissound "6" eq {
                "0" x soundlikethis
                x x 1 add lightthistoo
            } if
        } if
    } for
} def

// ? sm
/vpass101 {
    1 1    wlen 1 sub {
            /x exch def
            word x get 's' eq word x 1 add get 'm' eq and {
                x 1 sub getthissound isvoiced {
                    "18" x soundlikethis
                    x x 1 add lightthistoo
                    x x 1 sub lightthistoo
                } if
            } if
        } for
    } def

/lastpass {
    workingvword 2 get {
        itoa hex
    } foreach
} def

/light2gether {
    /x1 exch def
    /x2 exch def
    /lights workingvword 2 get def
    lights x1 lights x1 get 1 x2 bitshift or put
    lights x2 lights x2 get 1 x1 bitshift or put
} def

/light3gether {
    /x3 exch def

```

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```

/x2 exch def
/x1 exch def
/lights workingvword 2 get def
lights x1 lights x1 get 1 x2 bitshift or put
lights x1 lights x1 get 1 x3 bitshift or put
lights x2 lights x2 get 1 x1 bitshift or put
lights x2 lights x2 get 1 x3 bitshift or put
lights x3 lights x3 get 1 x1 bitshift or put
lights x3 lights x3 get 1 x2 bitshift or put
} def

```

```

/lightthistoo {
  /x2 exch def
  /x1 exch def
  /lights workingvword 2 get def
  lights x1 lights x1 get 1 x2 bitshift or put
} def

```

```

/soundlikethis {
  /x1 exch def
  /xs exch def
  /sounds workingvword 1 get def
  sounds x1 xs put
} def

```

```

/getthissound {
  workingvword 1 get exch get
} def

```

```

/countvowels {
  0
  word {
    /x exch def
    x 'a' eq
    x 'e' eq or
    x 'i' eq or
    x 'o' eq or
    x 'u' eq or
    {
      1 add
    } if
  } forall
} def

```

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/vowels "aeiou" def

```
/isvowel {  
  /l exch def  
  false  
  vowels {  
    l eq or  
  } forall  
} def
```

/consonants "bcdfghjklmnpqrstvwxyz" def

```
/isconsonant {  
  /l exch def  
  false  
  consonants {  
    l eq or  
  } forall  
} def
```

/voiced [ "1" "2" "4" "6" "8" "9" "10" "12" "15" "16" "17" "18" "21" "23" "25" "26" "27" "28" "29"  
"30" "31" "32" "33" "34" "35" "36" "37" "38" "39" "40" "41" "42" "43" "44" ] def

```
/isvoiced {  
  /ss exch def  
  false  
  voiced {  
    ss eq or  
  } forall  
} def
```

```
/issilent {  
  "0" eq  
} def
```

```
/dumpword {  
  dup 0 get print  
  dup 1 get { cvs ", " cat prin } forall  
  "" print  
  dup 2 get { cvs ", " cat prin } forall  
  "" print  
  3 get print
```

FOO020-42908260

# APPENDIX C

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T06020-42908260

TOP SECRET

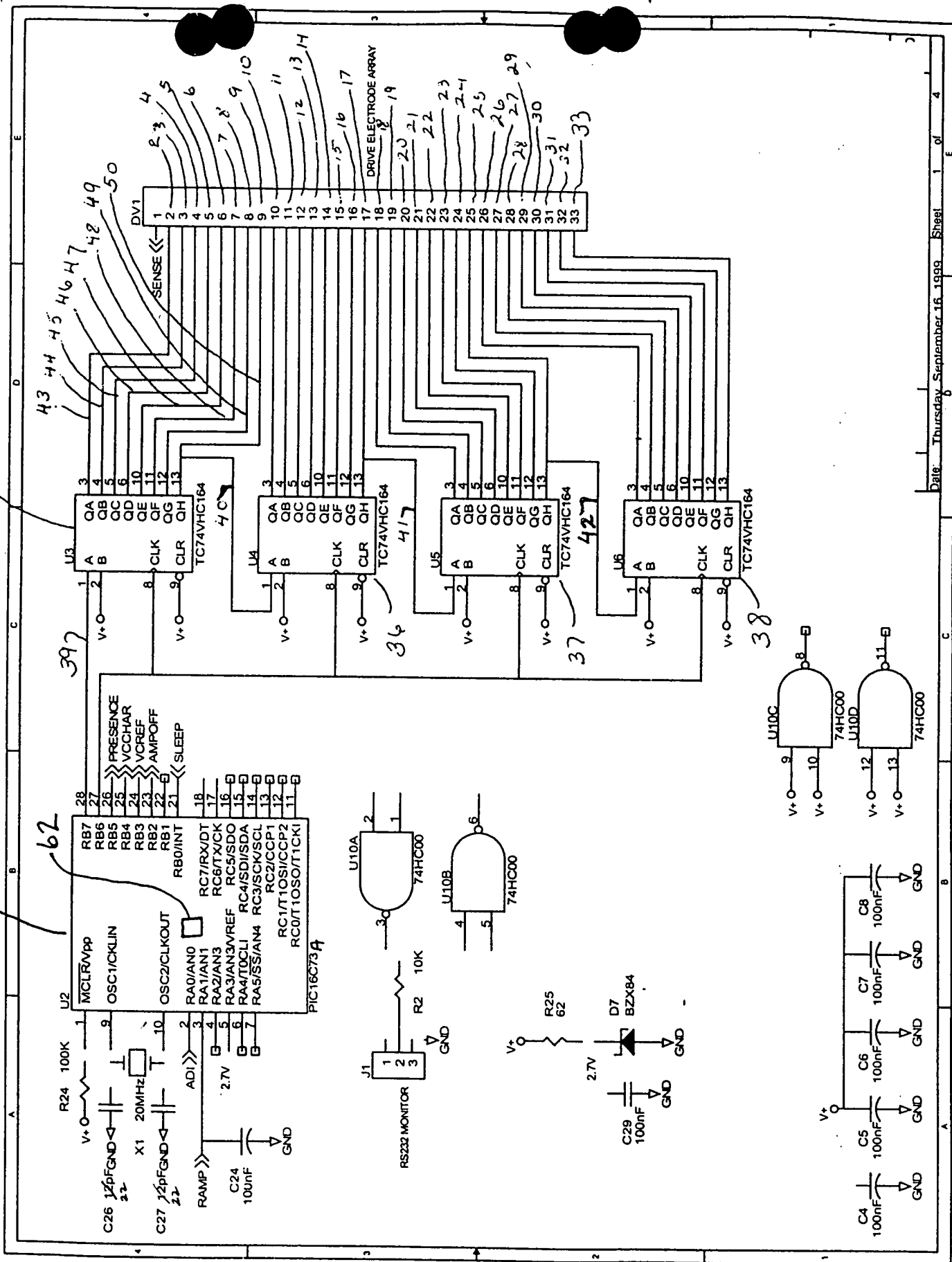


FIG. 2

A B C D E F  
 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

Date: Thursday, September 16, 1999 Filed: 2 of 4

SENSE  
 R4 10M  
 U7B LM324  
 R6 100K  
 C11 10pF  
 R7 10K  
 C12 20nF  
 VGND  
 800Hz  
 R3 1K  
 C9 100nF  
 U7A LM324  
 R5 20K  
 C10 10pF  
 800Hz  
 U7C LM324  
 ADI  
 61  
 63  
 64  
 65  
 67

VCC  
 C16 4.7uF  
 GND  
 V+  
 TP1  
 R8 100K  
 C17 4.7uF  
 R9 100K  
 TP2  
 O.V.  
 GND  
 U7D LM324  
 12  
 13  
 14  
 70  
 VIRTUAL GROUND  
 0V  
 GND  
 TP3

V<sub>+</sub>  
 C14 100nF  
 GND

Fig. 3

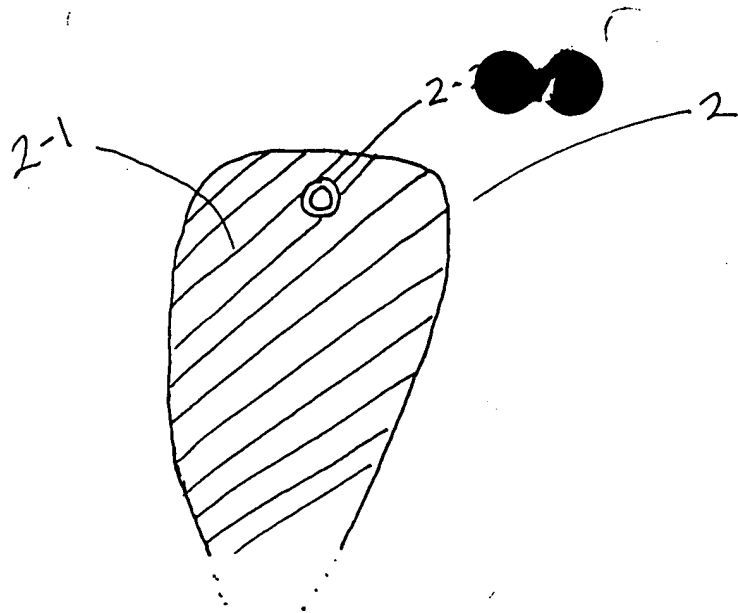


FIG. 4a

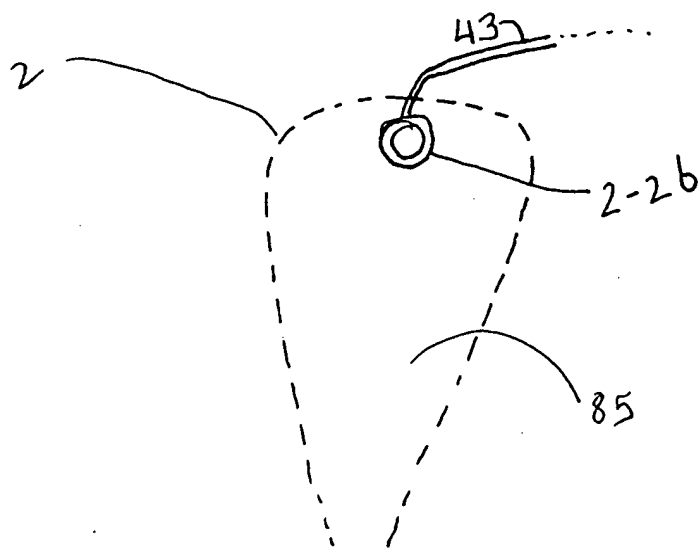


FIG. 4b





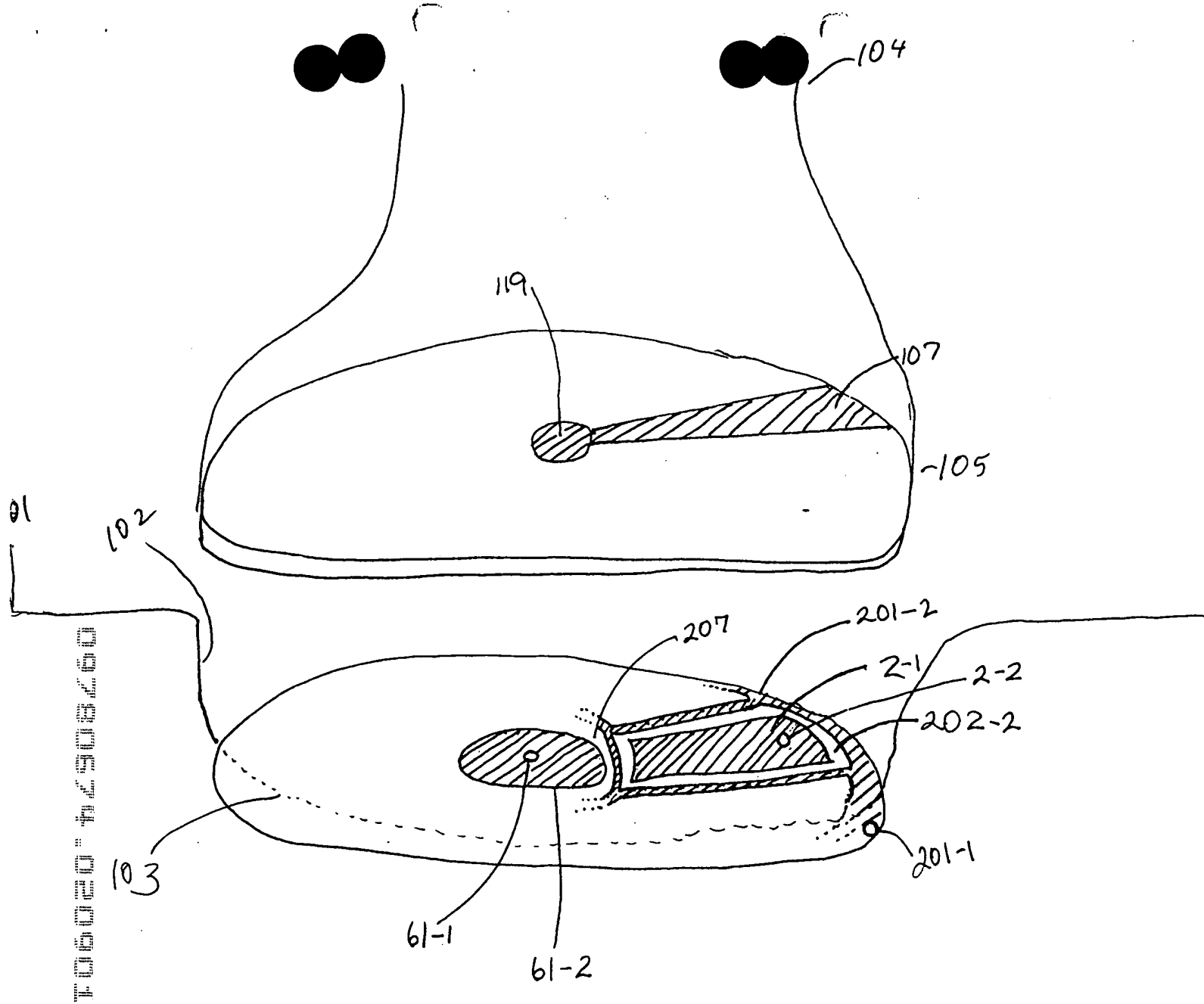


FIG. 11

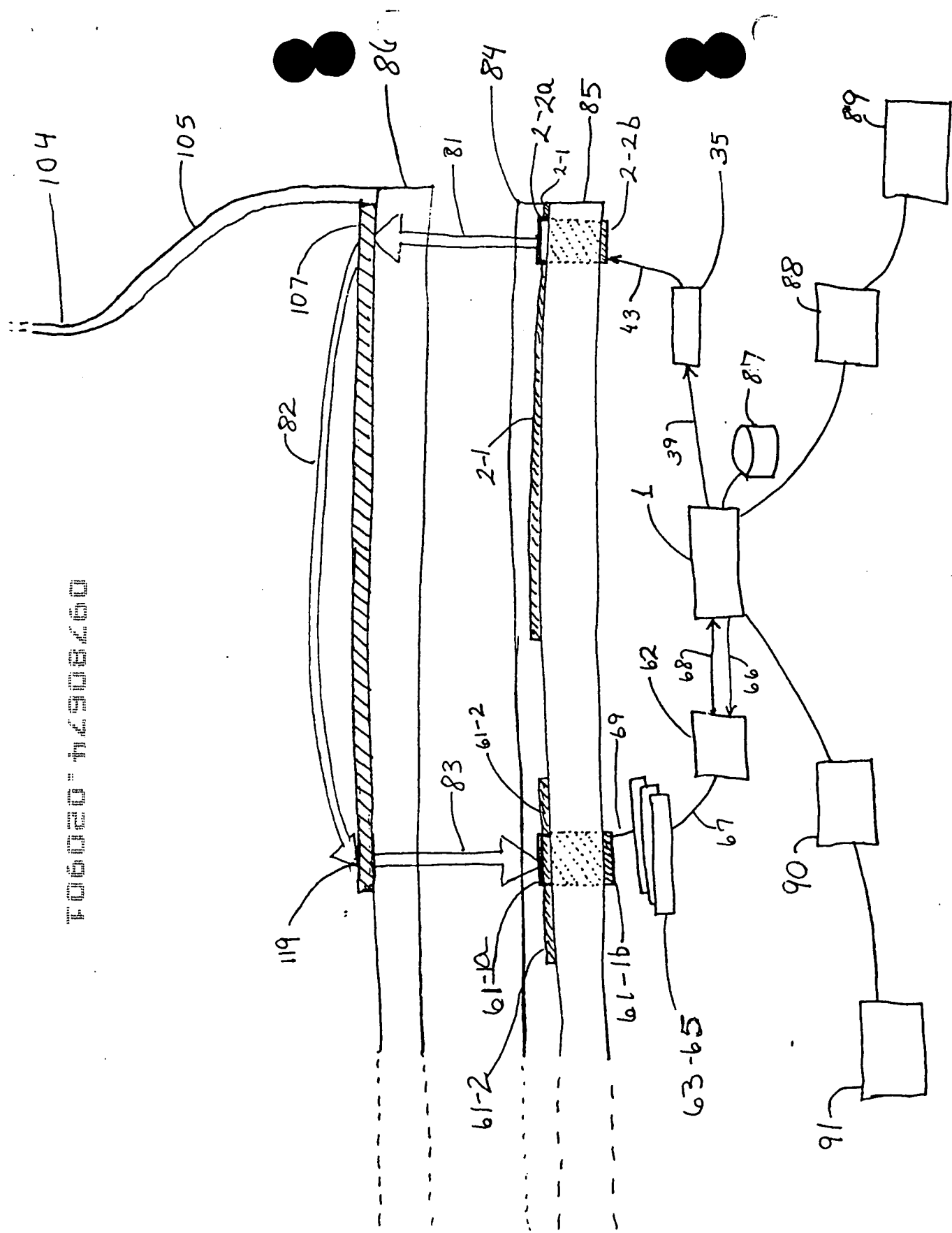


FIG. 12

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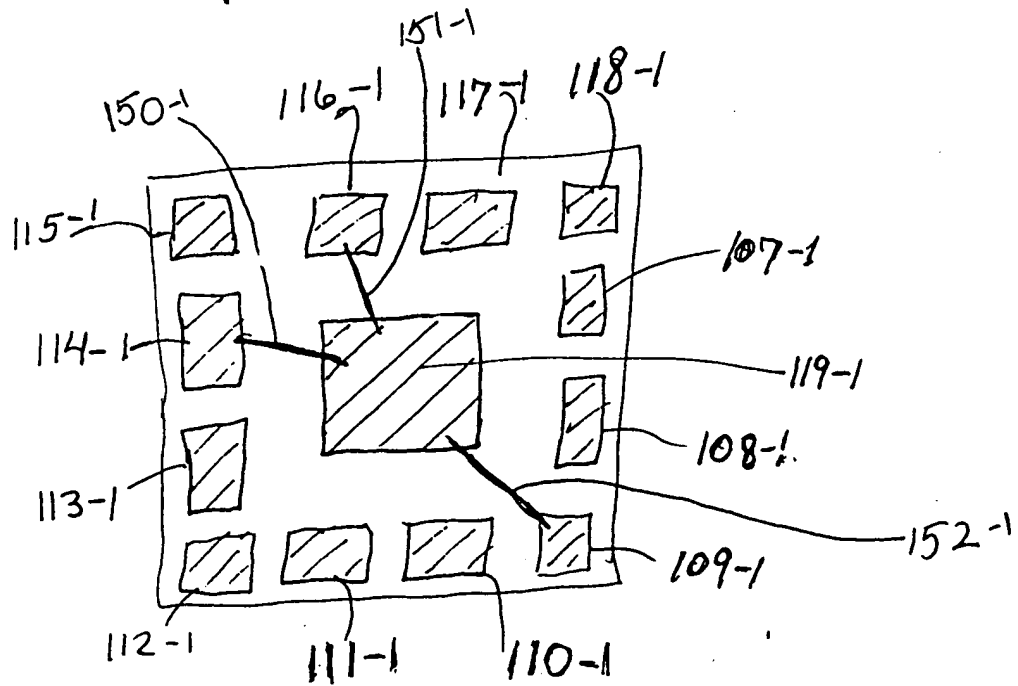
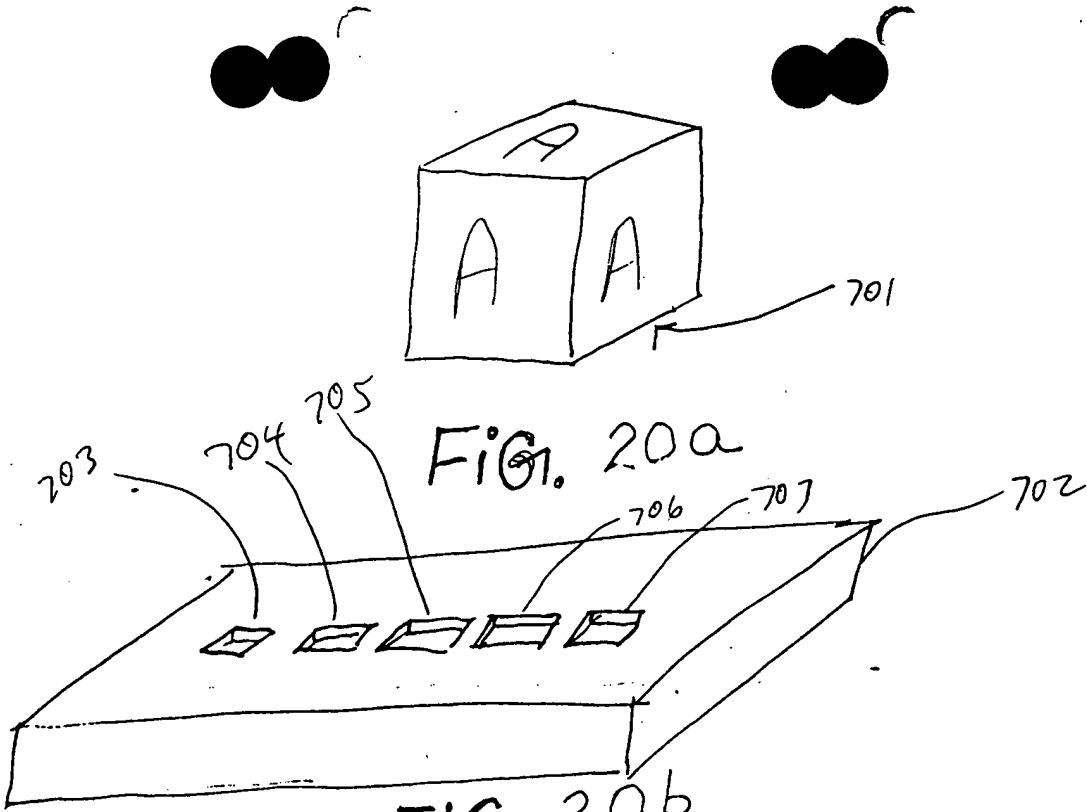


FIG. 20c

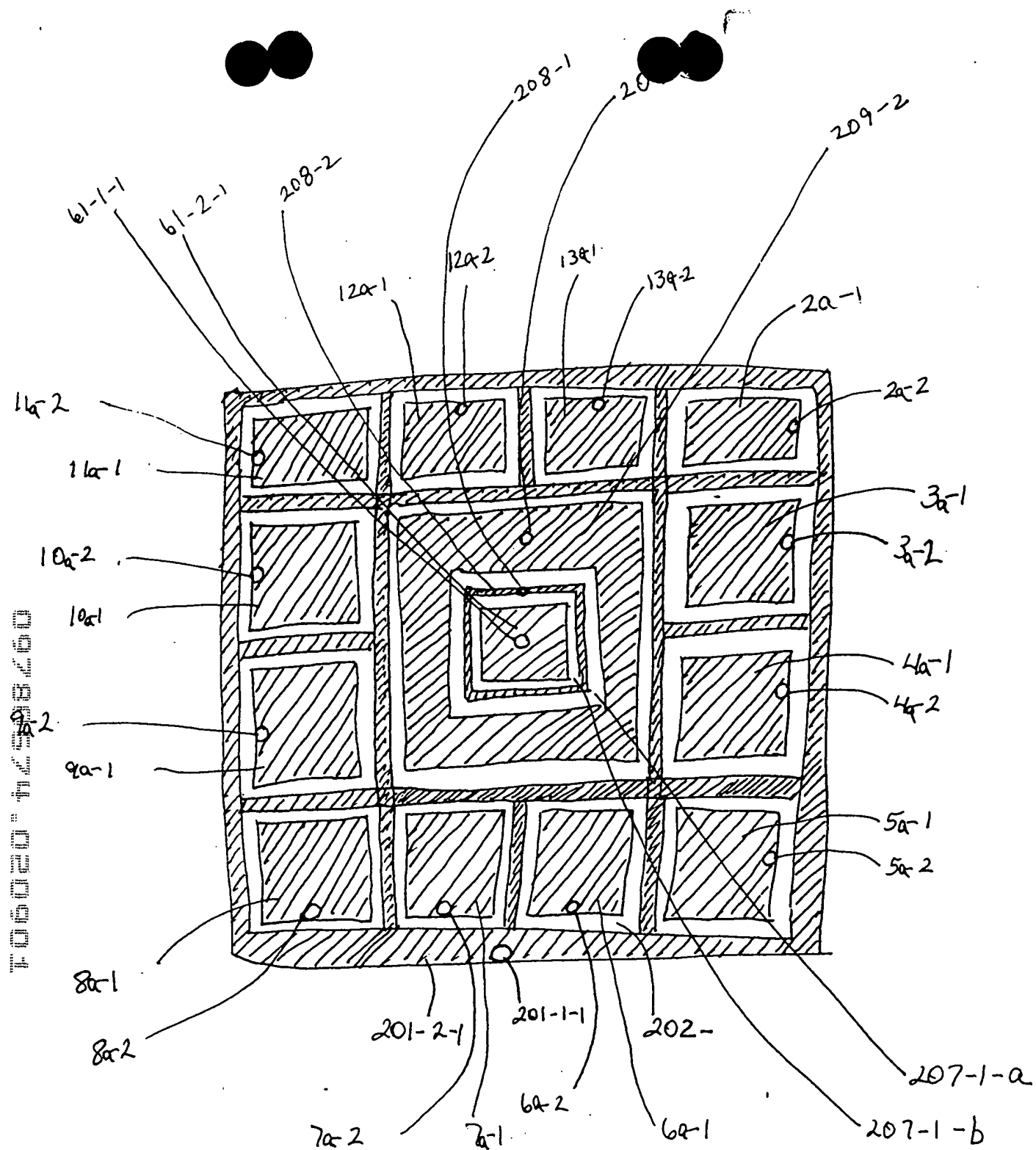
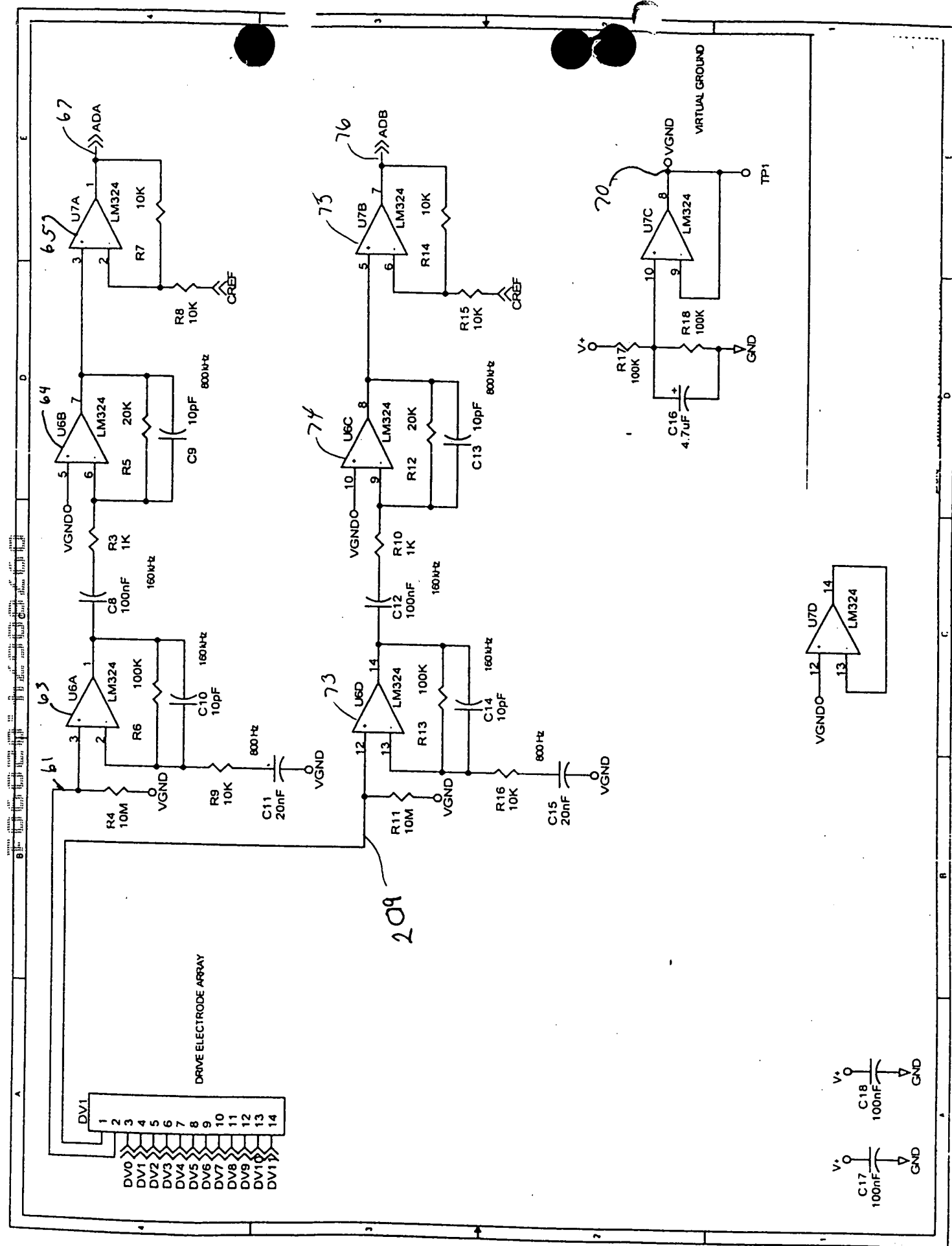


FIG. 21a



[illegible][illegible]

FOUO 42908260

/Alphabet 50 dict dup begin

'a' aDict def  
'b' bDict def  
'c' cDict def  
'd' dDict def  
'e' eDict def  
'f' fDict def  
'g' gDict def  
'h' hDict def  
'i' iDict def  
'j' jDict def  
'k' kDict def  
'l' lDict def  
'm' mDict def  
'n' nDict def  
'o' oDict def  
'p' pDict def  
'q' qDict def  
'r' rDict def  
's' sDict def  
't' tDict def  
'u' uDict def  
'v' vDict def  
'w' wDict def  
'x' xDict def  
'y' yDict def  
'z' zDict def

end

def

} def



```
/aDict LetterObj subclass dup begin
  /isvowel { true } def
  /snorm "31" def
  /sounds [
    "31"
    wavname
    readwav not { "readwav error" logstring } if
    dup buildwav not { "buildwav error" logstring } if
    "style1_a"
    wavname
    readwav not { "readwav error" logstring } if
    dup buildwav not { "buildwav error" logstring } if
  ] def
end
def
```

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T06020-12908260



```

        dup buildwav not { "buildwav error" logstring } if
        "style1_d"
        wavname
        readwav not { "file error" logstring } if
        dup buildwav not { "buildwav error" logstring } if
    ] def
end

```

```

def
/eDict LetterObj subclass dup begin
    /isyowel { true } def
    /snorm "32" def
    /sounds [
        "32"
        wavname
        readwav not { "file error" logstring } if
        dup buildwav not { "buildwav error" logstring } if
        "style1_e"
        wavname
        readwav not { "file error" logstring } if
        dup buildwav not { "buildwav error" logstring } if
    ] def
end

```

```

def
/fDict LetterObj subclass dup begin
    /isvowel { false } def
    /snorm "3" def
    /sounds [
        "3"
        wavname
        readwav not { "file error" logstring } if
        dup buildwav not { "buildwav error" logstring } if
        "style1_f"
        wavname
        readwav not { "file error" logstring } if
        dup buildwav not { "buildwav error" logstring } if
    ] def
end

```

```

def
/gDict LetterObj subclass dup begin
    /isvowel { false } def
    /snorm "4" def
    /sounds [
        "4"
        wavname
        readwav not { "file error" logstring } if
    ]
end

```

FOUO 2014-09-04

```

dup buildwav not { "buildwav error" logstring } if
"style1_g"
wavname
readwav not { "file error" logstring } if
dup buildwav not { "buildwav error" logstring } if
] def
end

def
/hDict LetterObj subclass dup begin
  /isvowel { false } def
  /snorm "5" def
  /sounds [
    "5"
    wavname
    readwav not { "file error" logstring } if
    dup buildwav not { "buildwav error" logstring } if
    "style1_h"
    wavname
    readwav not { "file error" logstring } if
    dup buildwav not { "buildwav error" logstring } if
  ] def
end

def
/iDict LetterObj subclass dup begin
  /isvowel { true } def
  /snorm "33" def
  /sounds [
    "33"
    wavname
    readwav not { "file error" logstring } if
    dup buildwav not { "buildwav error" logstring } if
    "style2_i"
    wavname
    readwav not { "file error" logstring } if
    dup buildwav not { "buildwav error" logstring } if
  ] def
end

def
/jDict LetterObj subclass dup begin
  /isvowel { false } def
  /snorm "6" def
  /sounds [
    "6"
    wavname
    readwav not { "file error" logstring } if

```

FOI b6 b7C b7D

dup buildwav not { "buildwav error" logstring } if  
"style2\_j"  
wavname  
readwav not { "file error" logstring } if  
dup buildwav not { "buildwav error" logstring } if

] def

end

def

/kDict LetterObj subclass dup begin

/isvowel { false } def

/snorm "7" def

/sounds [

"7"

wavname

readwav not { "file error" logstring } if

dup buildwav not { "buildwav error" logstring } if

"style2\_k"

wavname

readwav not { "file error" logstring } if

dup buildwav not { "buildwav error" logstring } if

] def

end

def

/lDict LetterObj subclass dup begin

/isvowel { false } def

/snorm "8" def

/sounds [

"8"

wavname

readwav not { "file error" logstring } if

dup buildwav not { "buildwav error" logstring } if

"style2\_l"

wavname

readwav not { "file error" logstring } if

dup buildwav not { "buildwav error" logstring } if

] def

end

def

/mDict LetterObj subclass dup begin

/isvowel { false } def

/snorm "9" def

/sounds [

"9"

wavname

readwav not { "file error" logstring } if

FOODS-4903260

```

dup buildwav not { "buildwav error" logstring } if
"style2_m"
wavname
readwav not { "file error" logstring } if
dup buildwav not { "buildwav error" logstring } if
] def
end

```

```

def
/nDict LetterObj subclass dup begin
  /isvowel { false } def
  /snorm "10" def
  /sounds [
    "10"
    wavname
    readwav not { "file error" logstring } if
    dup buildwav not { "buildwav error" logstring } if
    "style2_n"
    wavname
    readwav not { "file error" logstring } if
    dup buildwav not { "buildwav error" logstring } if
  ] def
end

```

```

def
/oDict LetterObj subclass dup begin
  /isvowel { true } def
  /snorm "34" def
  /sounds [
    "34"
    wavname
    readwav not { "file error" logstring } if
    dup buildwav not { "buildwav error" logstring } if
    "style3_o"
    wavname
    readwav not { "file error" logstring } if
    dup buildwav not { "buildwav error" logstring } if
  ] def
end

```

```

def
/pDict LetterObj subclass dup begin
  /isvowel { false } def
  /snorm "11" def
  /sounds [
    "11"
    wavname
    readwav not { "file error" logstring } if

```

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```

dup buildwav not { "buildwav error" logstring } if
"style3_p"
wavname
readwav not { "file error" logstring } if
dup buildwav not { "buildwav error" logstring } if

```

```

] def
end

```

```

def

```

```

/qDict LetterObj subclass dup begin

```

```

/isvowel { false } def

```

```

/snorm "46" def

```

```

/sounds [

```

```

    "46"

```

```

    wavname

```

```

    readwav not { "file error" logstring } if

```

```

    dup buildwav not { "buildwav error" logstring } if

```

```

    "style3_q"

```

```

    wavname

```

```

    readwav not { "file error" logstring } if

```

```

    dup buildwav not { "buildwav error" logstring } if

```

```

] def

```

```

end

```

```

def

```

```

/rDict LetterObj subclass dup begin

```

```

/isvowel { false } def

```

```

/snorm "12" def

```

```

/sounds [

```

```

    "12"

```

```

    wavname

```

```

    readwav not { "file error" logstring } if

```

```

    dup buildwav not { "buildwav error" logstring } if

```

```

    "style3_r"

```

```

    wavname

```

```

    readwav not { "file error" logstring } if

```

```

    dup buildwav not { "buildwav error" logstring } if

```

```

] def

```

```

end

```

```

def

```

```

/sDict LetterObj subclass dup begin

```

```

/isvowel { false } def

```

```

/snorm "13" def

```

```

/sounds [

```

```

    "13"

```

```

    wavname

```

```

    readwav not { "file error" logstring } if

```

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```

dup buildwav not { "buildwav error" logstring } if
"style3_s"
wavname
readwav not { "file error" logstring } if
dup buildwav not { "buildwav error" logstring } if
] def
end

```

```

def
/tDict LetterObj subclass dup begin
  /isvowel { false } def
  /snorm "14" def
  /sounds [
    "14"
    wavname
    readwav not { "file error" logstring } if
    dup buildwav not { "buildwav error" logstring } if
    "style3_t"
    wavname
    readwav not { "file error" logstring } if
    dup buildwav not { "buildwav error" logstring } if
  ] def
end

```

```

def
/uDict LetterObj subclass dup begin
  /isvowel { true } def
  /snorm "35" def
  /sounds [
    "35"
    wavname
    readwav not { "file error" logstring } if
    dup buildwav not { "buildwav error" logstring } if
    "style4_u"
    wavname
    readwav not { "file error" logstring } if
    dup buildwav not { "buildwav error" logstring } if
  ] def
end

```

```

def
/vDict LetterObj subclass dup begin
  /isvowel { false } def
  /snorm "15" def
  /sounds [
    "15"
    wavname
    readwav not { "file error" logstring } if

```

09780674-020904



```

dup buildwav not { "buildwav error" logstring } if
"style4_v"
wavname
readwav not { "file error" logstring } if
dup buildwav not { "buildwav error" logstring } if
] def
end

```

```

def
/wDict LetterObj subclass dup begin
  /isvowel { false } def
  /snorm "16" def
  /sounds [
    "16"
    wavname
    readwav not { "file error" logstring } if
    dup buildwav not { "buildwav error" logstring } if
    "style4_w"
    wavname
    readwav not { "file error" logstring } if
    dup buildwav not { "buildwav error" logstring } if
  ] def
end

```

```

def
/xDict LetterObj subclass dup begin
  /isvowel { false } def
  /snorm "47" def
  /sounds [
    "47"
    wavname
    readwav not { "file error" logstring } if
    dup buildwav not { "buildwav error" logstring } if
    "style4_x"
    wavname
    readwav not { "file error" logstring } if
    dup buildwav not { "buildwav error" logstring } if
  ] def
end

```

```

def
/yDict LetterObj subclass dup begin
  /isvowel { false } def
  /snorm "17" def
  /sounds [
    "17"
    wavname
    readwav not { "file error" logstring } if
  ]
end

```

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```

        dup buildwav not { "buildwav error" logstring } if
        "style4_y"
        wavname
        readwav not { "file error" logstring } if
        dup buildwav not { "buildwav error" logstring } if
    ] def
end

def
/zDict LetterObj subclass dup begin
    /isvowel { false } def
    /snorm "18" def
    /sounds [
        "18"
        wavname
        readwav not { "file error" logstring } if
        dup buildwav not { "buildwav error" logstring } if
        "style4_z"
        wavname
        readwav not { "file error" logstring } if
        dup buildwav not { "buildwav error" logstring } if
    ] def
end
def

```

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